DOCUMENT RESUME

ED 041 483 EM 008 271

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|---|---|
| AUTHOR | Bretz, Rudy |
| TITLE | Color Television in Instruction. |
| INSTITUTION | Rand Corp., Santa Monica, Calif. |
| REPORT NO | P-4402 |
| PUB DATE | Jun 70 |
| NOTE | 8p. |
| EDRS PRICE | EDRS Price MF-$0.25 HC-$0.50 |
| DESCRIPTORS | *Audiovisual Aids, Color Presentation, *Color Television, Equipment Evaluation, Instructional Aids, Instructional Television |

ABSTRACT

In spite of repeated research into the matter, no evidence has been discovered to support the claim that color television is superior to black-and-white television as an instructional aid. It is possible that there are advantages to color television which are unmeasured or unmeasurable, but the current claims for color; that it heightens realism, is more appealing, and is "expected"; cannot be supported. Color television is realistic only under the most perfect conditions of transmission and reception. Maintenance on color equipment is both more frequent and more costly. Thus the average color program is not realistic or appealing. A sharp black-and-white picture is more effective than the commonly seen smudgy color picture. People have become used to color from motion pictures and still photography. The technology of color television will undoubtedly develop in the coming years to the point where the medium is both reliable and inexpensive, but at the present time it is well to remember that the motivation of the learner and proper sequencing of learning objectives is more important than any aspect of the instructional media used. (JY)

ED041483

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# COLOR TELEVISION IN INSTRUCTION

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June 1970

EM008 371

P-4402

# COLOR TELEVISION IN INSTRUCTION

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Within the last few years color television has become very popular in the home, even though the cost of the average color receiver on the current market is about three times that of the average black-and-white model. Despite this cost difference, more color receivers were sold on the home market in 1969 than black-and-white sets, and it is estimated that of the 85 million television sets now in use in American homes, over a third are color receivers. Naturally, all commercial broadcasters who can afford it are transmitting in color, and the larger public broadcasting stations have also begun to convert to color. It is the "latest thing"; and as far as entertainment television is concerned, it is proved by popular acceptance to be more desirable than alternatives such as larger-screen black-and-white sets or multiple black-and-white sets in the same household. If, then, color TV is worth over three times as much as black and white to a viewing family, why shouldn't color TV be worth three times as much as black and white in instruction? The manufacturers are certain that it is, of course, and many educators do not need any sales persuasion to agree. Few people who have actually used color television in instruction, however, will express much enthusiasm for it, and many will openly declare color to be *less* useful than black and white. This paper will explore the reasons for this opinion and will estimate the time and conditions under which color TV will become generally acknowledged to be at least *as* useful as black and white in instruction.

Many research studies have investigated the relative usefulness, effectiveness, and practicability of color versus black-and-white films during the last few decades.** One important study was made by Joseph

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**Reference 1 contains a good bibliography on these studies.

Kanner of the U.S. Army, in 1959, who compared the teaching effectiveness of color versus black-and-white television.(2) Generally, to the surprise of the investigators, almost all such studies failed to obtain evidence that any knowledge or skill was learned more easily, more readily, or more thoroughly from color pictures than from black and white. This was true even when the informational content was especially chosen to be directly concerned with the recognition of color characteristics. There was, however, some evidence that "color coding" of significant items in an otherwise black-and-white film increased the retention of such items. While advertising researchers are convinced that color presentations affect people's buying attitudes and behavior, such affective objectives in instruction are difficult to specify and their attainment is nearly impossible to measure; hence, they are not usually considered. This point will be discussed later in connection with future predictions.

Referring again to Ref. 2, it was guessed that groups who watched black-and-white films and learned as much as similar groups who watched the same films in color did so because the colors, where colors were important, had been identified verbally. Where color was not important to the objective, the reason was more obvious; color produced no additional effect over black and white because none of the evaluation criteria (exam questions) depended on color knowledge or recognition.

That no instructional advantages to the use of color have been measured does not necessarily mean that there are none; it may merely mean that they have so far not been successfully identified and detected. Future developments in evaluation of achievement may change this picture. Thus, it is pertinent to speculate as to what these unmeasured or unmeasurable advantages might be. About 90 percent of nontheatrical (e.g., educational) films today are distributed in color even though color prints are more expensive than black and white would be. Why is it that educators, when they have a choice, prefer color? What arguments are given to justify the added cost?

Most proponents of color will mention heightened realism. This is the primary argument at least in the medical field. When instructional television was first proposed for medical centers, most doctors

expressed little interest unless it could be in color because they felt the increased realism was essential.

The second most common reason for the use of color is usually expressed by the term "effectiveness." Color is better, essentially, because it *looks* better. Color is more attractive, more decorative, more attention-getting and attention-holding. This is quite a different factor from realism. Color can often be attractive and decorative without being realistic at all. When these factors are said to have instructional value, it is not that they are believed to help particularly in learning knowledge and skills, except indirectly by focusing attention. but that they contribute to attitudes, feelings, motivations.

A third argument commonly heard is that today's student is familiar with color media, from Sunday newspapers to television. Most theatrical films are in color. Since he is used to color, he requires or at least expects color; anything less will simply fail to hold his interest.

What about "heightened realism"? Most experience with color television has indicated that realistic color, if it exists at all in color television, is a delicate thing which requires the best of equipment and the most painstaking care. One outstanding medical television color installation, from the standpoint of realism, was the studio at Walter Reed Hospital which operated during the early sixties. Broadcast quality equipment was used, and broadcast standard maintenance, lighting, and other procedures were followed. The studio was closed after a few years because its high cost could not be justified. Although the expensiveness of color equipment was realized and accepted, the additional maintenance requirement was frequently overlooked. Network engineers, a few years back, estimated color TV maintenance at about five times that of black and white; later, with improved equipment and personnel, this ratio was reduced to only two or three to one. Institutions that acquired color television, however, generally failed to provide even the lowest ratio. After a few years of poorly maintained medical television, doctors were heard to make such comparisons as "Good black and white is better than bad color," or "A functioning black-and-white system is better than a color system that is always down for repair."

Color television has made very few appearances in instruction over the past ten or fifteen years because of its relatively high cost. Broadcast quality color cameras required an outlay of $60,000 or more; a few substandard systems went for half this price but suffered badly in comparison when color realism was considered. In the past few years a large number of firms stimulated by the progress of the Japanese have put relatively inexpensive vidicon color equipment on the market. This has been accompanied by 1-in. and ½-in. video-tape equipment capable of recording and reproducing color. This color equipment has attracted the attention of educators because its relatively low initial cost made instructional color television appear practicable for the first time. However, even the demonstrations mounted at audiovisual and instructional TV conventions, which must be assumed to be under the best of conditions (high light levels, constant attention of first-class engineers, etc.), were generally unable to display color pictures of better than third-class quality. The best that could be said for many of them was that color was present. In some a strong color seemed to smudge over adjoining areas of weaker color, as though it had been chalk, applied with a sponge. In some the palette appeared to be limited to a harsh red-orange and an electric blue, with no clear yellows or greens or other in-between hues available. In none was there a faithful rendering of the colors which were visible in the subject before the cameras. In many demonstrations such comparison was not possible because prerecorded tapes were used and the original subjects were not present. Possibly the greatest disappointment, to this observer at least, was the first demonstration of an alternative to video-tape recording, a cartridge-loading device which is actually a miniature film system (images less than 4-mm in width) designed to be displayed on a television set. Not only was this color rendition totally unrealistic, but to this observer it was unpleasant as well, and appeared also to be inconsistent and difficult to adjust.

Probably the biggest bottleneck in the process of creating and delivering a high-quality TV image to the home viewer has always been the home receiver. This includes not only the relatively poor quality of the hardware involved (which is as inexpensive as possible for

competitive reasons) but also the variable of homeowner skill in picture adjustment. The average home viewer has consistently appalled TV technicians with the wide range of maladjustment of brightness, contrast, linearity, and focus which he will tolerate. When to these are added, in the color receiver, several controls for color balance which the viewer may also misadjust, the range becomes even greater. The reader need only visit a department store where several models of color TV receivers are simultaneously displaying the same program, to realize the great differences between color rendition on individual receivers, even when fairly well adjusted. And this is broadcast color television, a system which begins, generally, with pickup and transmission equipment putting out a picture equal or superior to the best-quality 16-mm film. One can only conclude that realistic color is not a very important factor in entertainment television.

If it is heightened realism which color television is to offer instruction, the prospect is dim. If classroom receivers will be largely consumer product models, as black-and-white sets in the schools are today, and operated by school staff personnel with little more technical expertise than home viewers, as black-and-white sets in the schools are today, realistic color can hardly be expected, even though black and white pictures, under these conditions, are on the whole acceptable.

If it is increased persuasiveness, added emotional appeal, a positive attitude, that color is to bring to instruction, I am afraid the chances are also fairly dim. To be effective, color must be pleasing. It must be capable of reproducing subtle gradations: a wide range of hues, a broad selection of tones and tints of every hue. While it is a matter of personal taste whether a color display is pleasing or not, the level of quality must be at least that of the average home receiver, however unrealistic the color may be. All I can offer in this area is the personal opinion that I would rather watch a good black-and-white image, even an *average* black-and-white image, than any of the non-broadcast color TV images that I have seen demonstrated. Others may disagree.

The third argument in favor of the use of color in instructional television is that it is familiar and hence demanded. Our culture is

filled, however, with simultaneously useful media on all levels of attractiveness and sophistication. Mimeograph and ditto reproduction methods are effectively used in instruction when texts with color plates are not available. It should be remembered that this, or any other instructional medium, plays only one role in a complex system of many elements, some of which--such as motivation of the learner and proper sequencing of the objectives--are far more important than any aspect of the media used.

Non-broadcast color television appears to be today about where amateur color photography was some twenty or more years ago. Because we now take good-quality color snapshots for granted, we tend to assume the same of the inexpensive color TV systems. But the analogy is not valid. We must not forget that with color photography the processing of the film is generally done by a highly professional laboratory under the most rigorously precise conditions. When an institution buys a color TV system, however, it undertakes to process the image (electronically, of course) in-house with its own trained, partially trained, or untrained personnel. Color television has a long way to go before it can offer educators a foolproof system that the average person can operate at home. Until the Land camera, color photography had never attempted it.

Progress, however, is inevitable in the field of technology, and progress is also being made in the understanding of learning and of the instructional process. It is my guess that practical means of measuring affective changes will be developed, and with this, whatever usefulness there may be for color in instruction can be proved. If that date is a decade or more ahead, the technology of recording, storing, and reproducing color images will also have made great strides. I believe we will see the universal use of color for all pictorial purposes, except when for special reasons monochrome is necessary or desirable. (The film medium appears to have almost reached this stage already.) I believe color television will then be as financially available and as practical in operation as black and white is today. Until that day, however, I believe black-and-white pictures will be fully sufficient for our present instructional purposes, and in comparison with unrealistic color, definitely superior.

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